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NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

MILITARY RETIREMENT REFORM: AN AUSTRALIAN PERSPECTIVE

by

Adam J. Crockett

March 2014

Co-Advisors: Jesse Cunha
Amilcar Menichini

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As the U.S. military looks to change its retirement foundation, either to address financial constraints or to realize more benefits in recruiting and retention, it is important that policy makers research and analyze all significant effects change could have on the military manpower system as a whole. In 1991, the Australian military moved from a system very similar to the U.S. model, where members were vested in a defined benefit scheme after 20 years of service to a scheme with defined benefits after only one year and compulsory contributions that were invested and returned to the member upon reaching retirement age and leaving the workforce. This paper conducts a qualitative review of the Australian and U.S. public, private, and military retirement paradigm and draws out similarities and lessons that can be learned, such as avoiding the complexity that has arisen in the Australian military retirement system. A quantitative analysis is then conducted on the last cohorts of the old U.S.-style retirement system and the first cohorts of the new system. Though the new system was found to change behaviors and produce a smoother separation profile it also raised questions about the effectiveness of retention bonuses and "grandfathering."

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MILITARY RETIREMENT REFORM: AN AUSTRALIAN PERSPECTIVE

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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

As the U.S. military looks to change its retirement foundation, either to address financial constraints or to realize more benefits in recruiting and retention, it is important that policy makers research and analyze all significant effects change could have on the military manpower system as a whole. In 1991, the Australian military moved from a system very similar to the U.S. model, where members were vested in a defined benefit scheme after 20 years of service to a scheme with defined benefits after only one year and compulsory contributions that were invested and returned to the member upon reaching retirement age and leaving the workforce. This paper conducts a qualitative review of the Australian and U.S. public, private, and military retirement paradigm and draws out similarities and lessons that can be learned, such as avoiding the complexity that has arisen in the Australian military retirement system. A quantitative analysis is then conducted on the last cohorts of the old U.S.-style retirement system and the first cohorts of the new system. Though the new system was found to change behaviors and produce a smoother separation profile it also raised questions about the effectiveness of retention bonuses and "grandfathering."

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LIST OF ACRONYMS AND ABBREVIATIONS

ADF	Australian Defence Force
COLA	cost of living adjustment
CPI	consumer price index
CSB	career status bonus
CSS	Commonwealth Superannuation Scheme
DB	defined benefit
DC	defined contribution
DFRB	Defence Force Retirement Benefits
DFRDB	Defence Force Retirement and Death Benefits
FS	final salary
FAS	final average salary
High 3	average of highest three salaries
IRA	individual retirement account
MSBS	Military Superannuation Benefits Scheme
OLS	ordinary least squares
REDUX	Military Reform Act of 1986
TSP	Thrift Savings Plan
U.S.	United States
YOS	years of service

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To my advisors: thank you for your advice.

To my wife: without your support, assistance and badgering, this thesis would never have been completed.

To my children: I am now complete so yes, I can get you a milk, and yes, I will help you build a Lego city; however, mum will still need to change the nappies.

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I. INTRODUCTION

The unique conditions of service experienced by uniformed personnel has meant military retirement plans have been different from other public and private plans, in recognition of service above and beyond the normal civic duties. As such, militarily retirement benefits have been generous when compared in context with public social security benefits and private retirement plans offered by civilian organizations. The U.S. military is currently considering a major reform in retirement benefits for current and future members of the military. The Australian Defence Force (ADF) undertook such a reform in 1991, and, as a result, many lessons and behavioral effects can be drawn from this experience to help inform U.S. policy makers. In simple terms, Australia moved from a plan very similar to that of the U.S. where members were vested in a defined benefit scheme after 20 years of service (YOS) to a scheme with defined benefits after only one YOS and compulsory contributions that were invested and returned to the member upon reaching retirement age and leaving the workforce.

There have been many works done on comparing international retirement models, such as those completed by Disney and Johnson (2001) and the World Bank (Pordes, 1994). There have also been various papers and reviews about Australian and U.S. military retirement on individual levels. Despite this little has been done in comparing the two systems and analyzing what can be learned from the two. Podger, Knox, and Roberts (2007) conducted a very brief comparison of the Australian military retirement system to that of the U.S, U.K., New Zealand, and Canada; however, this is very limited and only makes the conclusion that Australia compares "relatively well." Warner (2008) does provide a description and comparison of the U.S. military retirement to that of the United Kingdom military. My paper expands on this literature by combining the comparisons of the general Australian and U.S retirement models, the literature on the individual military retirement models, and new research showing the behavioral changes in Australian service members after the change was introduced in 1991.

The primary research goal of this paper is to identify lessons that can be learned from the Australian experience of changing its military retirement plan and how those

lessons apply to the U.S. military. This paper is structured into five chapters. After this introduction, in Chapter II, I review the broad contexts of Australian and U.S. retirement provisions; both publicly funded retirement and private retirement plans. This review sets the basis for a comparison of the military retirement strategy of each country. In addition to the descriptions and comparisons I discuss the retirement reform of the ADF in 1991, the lessons learned from the reform, and how they can apply to inform U.S. policy makers. In Chapters III and IV, I conduct an analytic review on the last cohort of the old ADF retirement plan participants, compared with the first cohort of the new scheme, analyzing the retention behavior of the two cohorts. Note the first cohort consists of two groups: one that chose to remain on the old U.S.-style defined benefit scheme, and a second that chose to switch to the new defined benefit/defined contribution scheme. This cohort is unique from the second cohort, all of whom were members of the new defined benefit/compulsory contribution scheme. Their retention behavior is tracked from enlistment up until June 2013. In Chapter III, I describe the data used to conduct the analysis, including the limitations of the data. In Chapter IV, I use a combination of kernel densities, survival analysis, and ordinary least square regression to examine the behavioral differences in the three groups. Finally, in Chapter V, I summarize the paper and provide a list of conclusions, lessons learned, and areas warranting further research for both Australian and U.S. policy makers.

I find that though at the outset the general retirement models of Australia and the U.S. appear to be dissimilar, upon close inspection they both have similar features albeit presented differently. This allows me conduct the comparison of military retirement in regard to the similar social constructs, public and private retirement models, and military structures of the two countries. My own analysis is supported by the findings of Podger et al. (2007) who conclude the new ADF retirement system is overly complex. This complexity is likely to affect the influence that the ADF system has on service members' retention behavior, as they are not fully informed of possible costs and benefits. The empirical analysis clearly shows that a change in retirement systems did affect the retention behaviors of service members. It is clear that the new ADF system controls for the issue, as described by Warner (2012), of inflexible workforce flow at 20 YOS.

Though the separation rates are much smoother with no spikes at 20 YOS as seen in the U.S. system, the analysis does not provide any insight about the quality of service members that are retained in comparison to the previous system. The results appear to support assertions made by Little (1996) that the bonus (one year's taxable salary) given under the new ADF retirement after 15 YOS may not be an effective or economical method of retaining a service member until 20 YOS. However, the long service leave bonus (three months' paid leave) after 10 YOS may have a significant effect. Further analysis with more robust data is needed to fully support these assertions. Finally, the analysis raises questions about allowing members to choose or "grandfather" retirement plans when a new system is introduced. Due to differences between the cohort that chose the new system and those that were on the new system without a choice, it is hypothesized that the group that could choose were forced to make decisions about their career much earlier the those who had no choice, which in turn led to different behaviors. This is does not necessarily imply a positive or negative effect on desired behaviors, however, it does lead to an interesting discussion that would require further research to fully analyze this issue.

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II. BACKGROUND

A. GENERAL

In the context of this study the military pension can be viewed as similar to a privately funded scheme with the "employer" being the respective government. For individuals, the ultimate goal of retirement payments (current or future) is to ensure a comfortable quality of life once they leave the workforce. In the context of the military it is important to note that in most cases retirement does not imply retirement from the workforce. For an employer the intent of providing retirement plans is to recruit, retain, and reward employees. For a government, publicly funded retirement schemes are about social welfare while privately funded schemes minimize the financial burden that aged citizens can have on society. As such, before specifically examining the Australian and the U.S. military retirement plans, it is important to discuss the general concepts of public and private retirement between the two countries. This will then allow me to compare the military retirement strategies within the context of how they fit within public and private retirement of the two countries.

Predominately the benefits of retirement can be viewed from two perspectives. Firstly, from a public policy and social perspective, industrialized countries such as the U.S. and Australia recognize the need for policy in order to ensure that the older members of society are supported when they are no longer able to earn income to support themselves. As identified by the World Bank (Pordes, 1994) changes in social trends imply that extended families and other traditional support mechanisms are declining and are more difficult to rely upon. As such, over the past 100 years throughout the industrialized world, government policy on retirement has slowly become a major part of a country's social construct (be it in the form of publicly funded systems such as social security arrangements, or in regulated privately funded systems, such as superannuation). Secondly, from an organization's perspective retirement packages play an important role in recruiting, rewarding, and retaining employees, which ultimately affects the productivity of an organization. However, unique from other productivity levers, retirement plans do not provide immediate benefits to personnel. An individual may not

receive any benefit from his decision until up to 40 years in the future, and the organization may incur financial obligations extending 60 or more years into the future as a result of that decision.

Generally, public pensions become available to the older generations of the workforce once they reach a certain age prescribed by the state. As described by Disney and Johnson (2001) there are three main types of publicly supported plans across the world. The first is the earnings-related plans such as those in France and Germany, in which members contribute as part of the tax collection; upon leaving the workforce the worker receives a pension commensurate with what he contributed into the system over his working life. The second type is the redistributive earnings-related plan, which is common in the U.S. and UK. This type is similar to the latter; however, it provides lower replacement rates to higher earners. Finally, there is the group of countries such as New Zealand and the Netherlands in which a flat pension rate based on residency and citizenship is used. Australia is unique amongst this group. Although Australia's plan has a flat maximum rate for public pensions, this rate is means tested and reduced based on a retiree's assets and other income (such as a military pension).

A common theme amongst industrialized countries entails cuts in future unfunded public plans and a move towards more privately funded ones. Private retirement plans come in three main forms:

- individual savings plans, which often have associated tax benefits when specifically linked to retirement;
- the more traditional, yet ever-decreasing, defined benefit plans; and
- defined contribution plans.

Defined benefit plans provide the employer with a pension or lump sum amount based on some sort of combination of productivity indicators (e.g., years' served and final wage). Defined contribution plans are a savings/investment plan partially or wholly funded by the employer. Defined contribution plans can have many features that are linked to an employee's personal savings plan, such as "matching" where the employer (or in some countries the state) will "match" or at least contribute additional funds if the employee chooses to invest more of his own savings into the fund (such as the 401k plans

used in the U.S.). In general terms the risk of a defined benefit plan lie with the employers, as they need to ensure they can fund the promised benefits well into the future. Conversely the risk of a defined contribution plan lies with the employee as the amount of money available at and throughout retirement is dependent on the investment strategy and market return of the savings.

1. Australian Public and Private Retirement

The Australian retirement income system is made up of three elements. First, a publicly funded, means tested aged pension; second, mandatory employer contributions to private retirement (either in the form of a defined benefit or defined contribution plan); and third, voluntary savings through either cash investments or other long-term investments such as property, shares, and managed funds (Warren, 2008). Encouragingly, this "three pillar" system for the provision of retirement income has been endorsed as a best practice by the World Bank (Pordes, 1994).

The aged pension was designed as a safety net for those not able to support themselves during retirement from the workforce (Warren 2008). It is paid when an individual reaches 67 years old; however, payment is means tested based on other income and assets. The maximum amount is AU$21,505 per annum for an individual or AU$32,471 for a couple. According to Disney and Johnson (2001) this amount only equates to approximately 33 percent of the pre-retirement income for the average retiree. The aged pension is reduced based on calculations that include income and total assets (with exemptions for house ownership); for example, a retiree with other retirement income over AU$47,605 per annum receives no pension.

The mandatory employer contributions and individual savings are combined under either a single fund or multiple investment funds. These investment funds must meet certain legislative requirements while allowing an employee options to move his contributions as he sees fit. Under the Australian government superannuation guarantee all employers must contribute a minimum of nine percent of an employee's ordinary time earnings to an approved fund. These employer contributions and any personal investments cannot be accessed until an employee reaches 60 years of age. Various other

pre- and post-tax incentives exist to encourage higher employee contributions and to extend retirement from the workforce beyond 60. To encourage low-income earners to participate, the government contributes $1.50 for every voluntary dollar contribution up to $1500 per year for those with income of less than $38,000. Those earning up to AU$58,000 are also eligible for government matching at reduced rates.

This system has been developed over many years with major reforms continuing from the late 1980s. Numerous ongoing reforms have led to a complex taxation system as a result of various attempts by successive governments to balance the incentives and taxes. It is the reforms of the late 1980s that led to the introduction of the new and current military retirement scheme, as the old scheme did not satisfy the conditions needed for mandatory employer contributions for those who served less than 20 years of service.

2. U.S. Public and Private Retirement

The U.S. retirement model is similar to that of Australia's in general terms of the three components of retirement income; however, the publicly funded pension is based on overall lifetime earnings and the employer contributions to a private plan are not mandatory. In accordance with tax laws, all U.S. workers contribute 6.2 percent of their taxable income to the old-age, survivors and disability insurance; more commonly referred to as social security insurance. Similarly all U.S. employers are also required to contribute 6.2 percent for each employee. Upon reaching 62 years of age and leaving the workforce individuals can start receiving social security payments at a reduced rate, with the full rate being paid from 67 years of age. As previously noted the system is redistributive so that those with higher incomes receive a proportionally lower return on their contributions. According to Beshears et al. (2009), on average social security replaces about 40 percent of pre-retirement income, although this varies widely across individuals. For lower income earners, this generally reduces the participation rate within privately funded plans despite the generous tax cuts available (Employee Benefit Research Institute, 2005), this is an important fact to consider when reflecting on an enlisted member with fewer than 10 years of service.

Individual retirement accounts (IRA) were established in 1974 with the intent of providing workers who had no employer-sponsored retirement plan access to tax-deferred savings (Disney & Johnson, 2001). After several legislative changes, IRAs are generally available to all tax payers and consist of two main types: the traditional IRA, where contributions are not taxed until they are withdrawn, or a Roth-IRA, where contributions are taxed; however, the withdrawals meeting the regulative conditions are not. Both of which have a maximum contribution currently at US$5500 per year; however, this amount often increases with inflation or other government policy changes (an additional US$1000 is allowed for those over 50).

Employer sponsored retirement plans are not mandatory, and according to Disney (2012), around 42 percent of civilian employees participate. In 1978, section 401(k) was added to the internal revenue code, allowing tax offsets for both employers and employees when contributing to a defined contribution plan. Combined with the reduced risk to the employer this has led to a steady decline in the defined benefit plans (Beshears et al., 2009). A typical 401(k) works very similarly to that of an IRA; however, the contribution limits are much greater. As of 2014, the maximum annual contribution allowed for a 401(k) was US$52,000 per year, with a maximum of US$17,500 being provided by the employee.

3. Differences between Australia and U.S. Retirement Income Models

The Australian replacements rates for publicly funded, old-age retirement plans are slightly lower than U.S. replacement rates (33 percent and 40 percent, respectively). Despite having a higher rate than that of Australia, the U.S. rate is still relatively low when compared to those of other industrialized countries (Disney and Johnson 2001; Beshears et al., 2009). Despite the Australian government superannuation guarantee, the aged pension is still the main source of retirement income. As the superannuation guarantee was only introduced in 1992 it is not expected to generate any significant benefits for at least another 15 to 25 years, when those who have had the guarantee in place for their entire working life leave the workforce. Additionally the mandatory contributions could be viewed as a publicly funded plan with the capital coming in the

form of a nine percent payroll tax on employers. Though having some fundamental differences it can be viewed as generally similar to that of the U.S. social security insurance arrangements. As discussed later, this is important to note when considering that under the current Australian military retirement income model all members receive some form of retirement pay regardless of years of service as do U.S. service members in terms of social security payments.

B. AUSTRALIAN MILITARY RETIREMENT PLANS

1. History

Some form of retirement plan has always been available to long-serving members of the Australian military; however, until 1948 these arrangements were not uniform nor were they well documented. In fact, each of the three arms of service had different arrangements; even within these services it was not clear what an individual was entitled to. My research did not uncover if the individuals themselves were unclear about their entitlements, just that they were not well documented. In 1948, a general review of policy with reference to the post-war military force saw the introduction of a uniform pay code amongst the Navy, Army, and Air Force. This review led to the standardization of retirement benefits, which was named the Defence Forces Retirement Benefits (DFRB) plan (Jess, 1972). The DFRB plan was broadly based on the provisions of the federal employees' Commonwealth Superannuation Scheme (CSS) (Cole et al., 1990); however, it was unique in the way that it met the special needs and conditions of service of military service members. In general, the plan provided retirees with a pension that was partly funded by member contributions—with the bulk being subsidized by the government. Specifically, the new DFRB differed from the CSS with the recognition of the compulsory retirement age of military officers as being much lower than the standard 60 to 65 age limit in the public sector. Despite the lower retirement age limit, members contributed the equivalent rate to those on the CSS, which made the DFRB very lucrative in comparison. Furthermore, unique to the DFRB, a member could commute a portion of his pension entitlement into a lump sum, a feature that was not present in the CSS (Jess, 1972).

2. Defence Force Retirement and Death Benefits Plan

A government review in 1972 concluded that an entirely new model was necessary in order to account for several issues with DFRB (Jess, 1972). As such, the similarly named yet substantively different Defence Forces Retirement and Death Benefits (DFRDB) plan was introduced in 1972. All contributing DFRB members (i.e., active military) were compulsorily moved into the DFRDB while retirees continued under the provisions of the DFRB. The DFRDB required all members to contribute 5.5 percent of their fortnightly salary into the government Consolidated Revenues Fund.

Members who had reached 20[1] years of full-time service were entitled to a pension payable immediately upon discharge from the military. The amount of the pension was a percentage of the member's final salary that increased with the number of years served. This percentage ranged from 35 percent for 20 years of service (YOS) and up to a maximum 76.5 percent for more than 40 YOS. After 40 YOS members are no longer required to pay the 5.5 percent contribution, though this represents a very small portion of serving members. The yearly increments are shown in the Table 1:

YOS	20	21	22	23	24	25	26	27	28	29	30
%	35.00	36.50	38.00	39.50	41.00	42.50	44.00	45.75	47.50	49.25	51.25
YOS		31	32	33	34	35	36	37	38	39	40+
%		53.25	55.50	57.75	60.25	62.75	65.25	67.75	70.50	73.50	76.50

Table 1. DFRDB Pension Increments.

The DFRDB also continued the option of allowing a retiree to receive a portion of the benefit in a lump sum in exchange for a reduced pension. Originally, this lump sum amount and resulting pension were specified based on rank and age; however, after changes to the pay structure it changed to a maximum lump sum amount being equal to five times the yearly pension and a reduced pension formula based on age and life

[1] In certain circumstances, 15 years of service (Commonwealth Superanuation Corporation, 2012).

expectancy figures. If a member receiving benefits dies and has a surviving spouse and/or dependent children, the plan allows for the member's family to continue receiving a benefit at a reduced amount.

Though all members were entitled to benefits after 20 YOS, in an effort to "encourage officers to serve until they reach a certain age" (Jess, 1972) a "notional" retirement age was introduced for officers only. For each year an officer is below the notional age (regardless of time served) his benefits would be reduced by three percent. For example, the notional retirement age for a lieutenant colonel (O5 equivalent) is 45; if a 42-year-old lieutenant colonel was to retire, he would have his pension reduced by nine percent.

In most cases, if a member leaves the plan prior to the 20 YOS the member would receive his contributions back with no interest. In some cases, a small gratuity is paid.[2] Immediately upon discharge if the member started work as a federal employee the benefits could be preserved and transferred into the equivalent CSS. The member would only be entitled to the benefits of the CSS plan; however, the member's time served in the military would be counted as years participating in the CSS.

Separate from the DFRDB, since 1988 all members, regardless of years of service, accrued a "productivity benefit" equivalent to three percent of the member's yearly salary was paid by the government into an investment fund where it earned interest in accordance with the fund's performance. Upon reaching preservation age (generally 60 to 65 years old) the member can collect that amount as a lump sum. This feature was introduced after major reforms in the Australian superannuation laws meant that the DFRDB was not sufficient to meet the minimum standard required by law.

As of 2001, DFRDB members have been permitted to make voluntary payments on their or their spouse's behalf in the government-run "Military Super" investment fund (Commonweath Superanuation Corporation, 2012). These payments attract no

[2] Despite being referred to in various texts, including current DFRDB information, further information other than casual references regarding this practice could not be found using public sources. A request for more information was sent to the Australian government; however, it did reveal any significant information. A review of some pamphlets given to members at the time indicates it was between three and six percent of the total returned contributions dependent on YOS.

administration fee; this is not offered to other private superannuation funds and dependent on the amount of the payments and chosen fund can equate to over 20 percent of the total amount during the lifetime of the investment. The payments have no bearing on other DFRDB benefits.

3. Military Superannuation and Benefits Scheme

Following the reforms to the Australian superannuation and retirement regulations in the late 1980s, the Australian government commissioned a review of the suitability of the DFRDB under the new superannuation arrangements (Cole et al., 1990). The review led to the creation of an entirely new and unique retirement system, the Military Superannuation and Benefits Scheme (MSBS). MSBS is unique in that it has two parts:

- the employer benefit, which is similar to a traditional defined benefit; however, it is only accessed either as a pension when the member is 55 years old or as lump sum or pension after 65 years old; and
- the member benefit, which is a similar private saving scheme where the member contributes between five percent (mandatory minimum) and 10 percent (maximum allowable) of fortnightly earnings into an investment fund.

The employer benefit is available to all members after only one year of service and the member benefit contributions are payable immediately after enlistment.

The employer benefit is calculated based on the member's years of service and final average salary (FAS) for the last three years of service. It is calculated as a lump sum amount when the member is discharged from the military. Three percent of this amount is invested into an investment fund and represents the "productivity benefit" required under Australian superannuation regulations. The remaining amount is recorded and subject to annual consumer price index (CPI) increases. Upon reaching 55 years of age the member can choose to have some or all of the employer benefit converted into a pension. The pension amount is derived by dividing the final lump sum amount (the productivity benefit and the indexed amount) by a factor of 10 at age 65, increasing by 0.2 for each year the member is less than 65. For example, if the lump sum amount was $120,000 a 65-year-old would receive a pension of $120,000/10 = $12,000 whereas a 55-year-old would receive a pension of $120,000/(10+ (10 x 0.2)) = $10,000. Members

can also choose to convert only a portion of the amount into a pension with the remainder being given as a lump sum. The minimum amount that can be received as a lump sum is 50 percent, with the full amount available if the member desires. If the member has not converted the amount into a pension after he is 65 years old, the amount is paid out as a lump sum when he leaves the workforce.

The member benefit is much simpler to understand. Service members contribute a minimum of five percent of their fortnightly pay to the member benefit portion of the scheme. Members can elect to contribute as much as 10 percent, which can be changed once every three months to any integer between five and 10 percent. These contributions are paid into an investment fund where members choose their investment strategy based on five options ranging from a low-risk/low-return option up to a high-risk/high-return option. The members' total contributions can be portioned into any of the five strategies as they see fit. Members can also change their investment strategy once every three months. No additional matching is provided; however, the scheme provides minimum fees, which are not replicated in private superannuation saving schemes. Upon the member's discharge the benefit is preserved in the fund and continues to accrue interest, and the member can continue to monitor and change his investment strategy. After a member reaches the age of 65 and retires from the workforce, he can access this money subject to normal superannuation taxation rules.

Similar to the DFRDB, members can elect to make voluntary payments on their or their spouse's behalf into the Military Super investment fund. These contributions are separate from the member benefits and separate taxation rules apply.

An additional and very important component of MSBS is the 15-year retention bonus, which is an addition to normal compensation and promotion incentives for members to continue to serve until 20 YOS. When MSBS was introduced there was a concern that the military would lose experienced soldiers at a higher rate, as other than long service leave (three months' paid leave) after 10 YOS there was no additional incentive (Cole et al., 1990). As such, the MSBS retention bonus was included as part of the scheme. After 15 YOS members who elect to commit to an extra five YOS receive a bonus equivalent to one year's salary as taxable income. The commitment is not,

however, fully binding; members who choose to leave prior to completing the five YOS obligation are required to pay back the un-taxed pro-rata amount of the bonus. The member can then also apply to the taxation office to receive a refund of the taxed portion of the amount.

4. DFRDB/MSBS Effect on Taxation and the Aged Pension

The DFRDB pension, as well as any other sources of income an individual may have, is taxed at normal marginal tax rates. A tax offset of up to 15 percent is applied to the marginal tax rates for individuals when they reach the age of 60. The three percent productivity benefit is paid as a lump sum when a member reaches retirement age and leaves the workforce and an individual is not taxed on this amount.

For the MSBS if the employer benefit is taken as a pension it is also taxed at normal marginal tax rates with an offset for individuals aged 60 and over, with the exception of the three percent representing the productivity benefit, which is not taxed. The member benefit when paid is not taxed as the original contribution was paid post tax.

As previously stated, the aged pension is available to all individuals over 67; however, it is means tested based on other income and total assets. As such, almost all DFRDB recipients would either have a reduced aged pension, if at all. Those members on MSBS would be dependent on the total amounts of their benefit based on years served and additional payments made into the member benefit portion.

It should also be noted that since MSBS' inception in 1991 Australian superannuation laws have gone through a period of vast and continuing change. Though the actual rates, retirement ages, and methods of taxation for DFRDB and MSBS have changed, the overall concept of taxation has remained relatively consistent; that concept includes taxing any income earned prior to actual retirement at the normal marginal tax rates and applying offsets after retirement. The changes, however, are likely to mainly affect the decisions made by those retiring from the workforce.

5. Comparison of DFRDB and MSBS

As of October 1, 1991 all new entrants in the Australian Defence Force were made members of MSBS. Existing members on DFRDB had until September 30, 1992 to choose either to remain on DFRDB or transfer to MSBS. It was expected that the majority of DFRDB members would transfer to the new scheme (Military Superannuation and Benefits Board of Trustees, 1992); however, in reality 50.3 percent of soldiers and 45.7 percent of officers made the election to switch to MSBS. Moreover, 85 percent of the soldiers who did switch to MSBS had less than 10 years' experience (Little, 1996).

Table 2 shows an example of cost and benefits for an enlisted soldier after 20 to 35 YOS. All values have been adjusted to reflect the amounts after 20 YOS for an enlisted soldier who joined at 20 years of age and life expectancy of 80 years (ABS, 2013) was used to calculate cumulative pension values; full details of the calculations and assumptions are detailed in Appendix B. While members were vested in MSBS after one year of service, as discussed earlier, this requirement was due to the changes in Australian law. As such, any member with 19 or fewer years of service would obviously do better with MSBS. For the purpose of this study the difference at 20 years is important to examine, as it is at this point where the choice between DFRDB and MSBS becomes tangible.

	DFRDB		MSBS	
YOS	**Total Benefits Received ($)**	**Total Government Contribution ($)**	**Total Benefits Received ($)**	**Total Government Contribution ($)**
20	982,408	982,408	853,607	508,182
25	1,089,452	1,089,452	1,103,903	635,630
30	1,179,463	1,179,463	1,313,928	710,868
35	1,248,759	1,248,759	1,357,672	770,797

Table 2. DFRDB MBSS Comparison Example.

The total government contributions refers to how much the government would be required to pay in order to fund the plan as a lump sum after 20 YOS. The amounts do

not take into account the fiscal policy of the government and therefore it is difficult to make many firm conclusions. What it does show, however, is how MSBS benefits are linked to market performance and hence despite being a defined benefit plan, it places some of the risk on the service member. With DFRDB the risk is entirely with the government. That is to say that only a portion of the MSBS amount is the future responsibility of the government and hence possibly reducing the tax payers' burden in times of economic downfall.

The DFRDB calculations are fairly straightforward and represent the total cumulative pension less the contributions paid. Of note is that though two members with the same rank and same YOS would receive the same pension value, the amount paid for by the government would depend on the age of the members. For example, a 20-year-old retiring at age 40 would receive approximately eight percent more over his life time than a 24-year-old. Some differences may occur due to a member's promotion profile and the total amount of contributions paid. MSBS is more complicated to calculate and the figures shown are only one example. Two members who retire at the same rank after the same number of YOS can have vastly different final amounts. The employer benefit varies based on the last three years of service. A member who was promoted just prior to retirement will receive a smaller amount than a member of the same rank and YOS who had held that rank for at least three years prior to retiring. The promotion profile will also significantly affect the employer benefit. A member who was promoted quickly early on in his career before settling at a particular rank would have paid a higher member contribution compared to a member again of the same rank and YOS who was promoted more often toward the end of his career. Though this would be the same for DFRDB, the amounts are more defined for MSBS due the compounding interest payments.

The calculations also do not take into account the investment choices each individual member makes; that is, how a DFRDB member chooses to invest his pension prior to leaving the workforce will have a significant effect on his old age income. For example, a 20-year-old who retires at age 40 has 25 years before the normal retirement age of 65; therefore, he is likely to have at least one other full career during that time. The member can choose to invest all or only some of his pension toward old-age retirement.

The return on this benefit will depend on the choices made after separation from the military. This is particularly important to note when considering DFRDB (similarly, U.S. retirement) as a means of income for old age retirement. These types of defined benefits models only provide suitable old age retirement income if an individual either invests his benefit instead of using it as an income supplement, or an individual serves for an extended period. In the case of DFRDB, at least 30 YOS is required before the pension amount alone would provide a suitable quality of life after retirement.

The MSBS member faces very different choices. Though he can choose to invest an additional five percent into his member benefit, this would be equivalent to a DFRDB member investing additional money into a non-employee sponsored superannuation account. Thus, in comparison to the DFRDB member, the MSBS member's choices are limited to which investment strategies he chooses out of the five available options. Assuming the DFRDB pension was not invested this example shows after about 22 years of service the MSBS plan yields higher amounts.

6. Podger Review

A government review into military retirement conducted in 2007 arrived at the following conclusion:

> While the MSBS compares reasonably well with most overseas military schemes and with other Australian schemes for 'uniformed bodies,' it still falls well short of best practice contemporary superannuation and does not contribute significantly towards recruitment and retention. The DFRDB is rated well below the MSBS. (Podger et al., 2007)

As such, the review committee recommended a completely new, alternative scheme. This new recommended scheme was a simple defined contribution plan with employer contributions starting at 16 percent and increasing to 28 percent as length of service increased. The review committee based its assessment of DFRDB, MSBS, and the new scheme on six desirable characteristics, which the committee claims form a best practice for "contemporary superannuation, the potential on recruitment and retention and the unique nature of military service." These six characteristics include: flexibility, simplicity, adequacy, tailored, visible attractiveness, and financial sustainability.

a. Flexibility

The review found that DFRDB provided no flexibility in the contribution amount and only limited flexibility for the benefits (computation of pension into a lump sum). The MSBS was rated slightly higher in flexibility due to options with both contributions and benefits. However though not stated in the review it should be noted that for younger members separating from the military after 20 YOS, DFRDB provides much greater flexibility for investment of pension payments.

b. Simplicity

Neither scheme was rated highly for simplicity—particularly MSBS, as it was "too complex for members to understand" and its "complexity undermines the potential benefits of the schemes structures."

c. Adequacy

As expected both schemes were found adequate for long-term members (20 or more YOS); however, DFRDB was rated inadequate for short-term members. The review found that while MSBS does give some benefit to short-term members, the preservation arrangements of the employer benefit (i.e., CPI indexed for 97 percent of the amount until preservation age) meant that this benefit gave the appearance of being generous. In reality, it was much less so for young members who had served only short periods.

d. Tailored

In the context of the review, the "tailored" characteristic was used to address the unique nature of military service, and both schemes were found to meet this characteristic.

e. Visible Attractiveness

Both schemes were also found to have only limited visible attractiveness in terms of recruiting and retention. DFRDB was limited due to the requirement to make a long-term career decision early on, and MSBS was limited due to its complexity, which makes it difficult to understand.

f. Financial Sustainability

Finally, neither scheme was found to be financially sustainable due to the unfunded nature of the pension for DFRDB and the employee benefit for MSBS.

The recommendation for a new retirement scheme was not adopted by the government at the time, and MSBS remains the current ADF scheme with no foreseeable change in the near future. The number of active members on DFRDB continues to decline, with less than three percent expected by 2015 and less than one percent by 2020 (DGPERS-A, 2012).

C. U.S. MILITARY RETIREMENT POLICY AND PLANS

1. History

U.S. military retirement policy can be traced back to the first national pension law of 1766, although the precedents of this law are likely based on the arrangements of the British forces. By 1873 military officers with 30 years or more service could retire with a fixed 75 percent pension. The next major reform did not come about until the post-World War II period when the Hook commission noted a concern that too many senior personnel were remaining in the forces and recommended an "immediate and generous retirement benefit to those members with 20 years' service." This saw the introduction of the "base pay" plan in which after 20 years of service a member would receive 50 percent of his base pay and 2.5 percent extra for every year served after 20 years. Over the years several minor changes have occurred mostly in relation to the administration of the plan (Defense Manpower Data Center, 2010).

2. Military Reform Act of 1986

The next major reform, the Military Reform Act of 1986, colloquially known as REDUX, saw a reduction in the final benefits to 40 percent of the average highest 36-month salary after 20 years. It included an increase of 3.5 percent for every additional year of service, with a maximum of 75 percent after 30 years. The yearly increments are shown in Table 3.

YOS	20	21	22	23	24	25	26	27	28	29	30
%	40.00	43.50	47.00	50.50	54.00	57.50	61.00	64.50	68.00	71.50	75.00

Table 3. REDUX Pension Increases.

However, REDUX did include a "career status bonus" (CSB) after 15 years of service and agreement to continue until 20 years (currently $30,000). In 2000 REDUX was changed so that the yearly indexing arrangements, known as Cost of Living Adjustments (COLA), based on CPI, were reduced by one percent. When the member reaches the age of 62 there is a one off adjustment so that the amount is equivalent to members on the alternative High-3 plan; however, thereafter the one percent reduction remains in force. For example, a service member after 24 years of service and choosing REDUX would have received the $30,000 CSB at 15 years of service. Upon retirement this individual would receive 54 percent of his average highest 36-month salary (40% + 4 x 3.5%), indexed at one percent less than the COLA. At 62 years of age, he would receive 60 percent of his average highest 36-month salary (50% + 4 x 2.5%), indexed at one percent less than the COLA.

3. High-3 Pension Formula

In 2000, after congressional reviews in the late 1990s noted "potential recruiting and retention problems" related to REDUX due to a strong economy (Henning, 2012), the U.S. military reverted back to the old system with an option for members to choose the REDUX plan. However, this system would have a unique difference in that pension pay would now be based on the average highest 36-month salary (as opposed to the final base pay salary); this formula became known as the High-3. Active members who joined prior to September 1980 are still on the old base pay system. It is expected that almost all members on this system will have retired by 2016 (Henning 2012). The yearly increments of the High-3 scheme are shown in Table 4.

YOS	20	21	22	23	24	25	26	27	28	29	30
%	50.00	52.50	55.00	57.50	60.00	62.50	65.00	67.50	70.00	72.50	75.00

Table 4. High-3 Pension Increases.

In most cases a maximum amount received is 75 percent regardless of years served beyond 30 YOS. Once a member is separated and starts receiving payment his payments are indexed using the yearly COLA figures.

4. Thrift Savings Plan

All active military members regardless of years in service are also eligible to contribute to the federal employee Thrift Savings Plan (TSP). This is not compulsory and no matching amount is provided to military members; however, it does allow military members to place higher amounts of tax-deferred payments than is permitted by other private savings schemes (Department of Defense of the Under Secretary of Defense for Personnel and Readiness, 2012)

5. Taxation and Social Security

All components of the U.S. military retirement plan (including the CSB) are subject to federal retirement income tax unless retirement is the direct result of a disability. Generally an additional 10 percent tax is applied until the individual reaches 59.5 years of age. As all military members still contribute to social security, an individual's military retirement income has no impact on social security payment. From 62 years of age if a military member leaves the workforce, he can also begin receiving social security payments in addition to his military pension.

D. NEED FOR CHANGE

The primary context for change in Australia was the reform of the general superannuation regulatory framework for all employers. By contrast., the current economic position of the U.S. government following the global financial crisis and downsizing after extended military commitments on two major fronts, it would appear that efficiency and cost structure are the main drivers for the most recent discussion about

the need for change in U.S. military retirement programs. The most recent major review of U.S. military retirement policy cited equity, recruiting and retirement benefits, and the unsustainable cost associated with an unfunded defined benefit plan as reasons that the system required change. All these reasons have been discussed and researched ever since the current plan emerged after the Hook Commission (Department of Defence of the Under Secretary of Defense for Personnel and Readiness, 2008). Likewise, though not the catalyst, these arguments were also significant considerations that helped shape MSBS (Cole et al., 1990).

E. COMPARISON OF AUSTRALIAN AND U.S. MILITARY RETIREMENT PLANS

Appendix A shows a comparison of the features of the DFRDB, MSBS, High-3, and REDUX plans in tabular form. In general terms, the Australian DFRDB can be likened to the U.S. High-3 plan. Though contributions and payments are different, due to the fact that a member needs to serve at least 20 years before any positive benefit is received, it would be expected that behaviors related to retention would be similar. The MSBS is also analogous to the U.S. plan as the additional contributions for the member benefit are similar to voluntary payments into a TSP. Of particular note are other aspects of military compensation that must be taken into consideration when comparing the systems on a holistic level. This paper does not detail aspects, such as health care benefits, death and disability benefits, and general compensation and bonuses. All of these aspects play an important role in the overall context of military compensation, of which retirement is only one part. This limitation, combined with the albeit similar yet different contexts of the old age retirement and small differences in social structures between the U.S. and Australia, make direct comparisons using monetary values difficult and unlikely to provide an accurate evaluation. Nevertheless, as previously stated, due to the fact that DFRDB operates with the same general principles a broad comparison with the U.S. system is possible.

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III. DATA

A. SAMPLE DESCRIPTION

The data used in this study is provided by the Australian Directorate of Workforce Modelling, Forecasting and Analysis–Army (DWMFA-A). The sample contains newly enlisted and officer recruits for all services from September 1, 1990 until September 30, 1992, allowing for the creation of three distinct groups: the first two are those who enlisted between September 1, 1990 and September 30, 1991 and had a choice between DFRDB and MSBS, and the third group includes those who enlisted between October 1, 1991 and September 30, 1992. As these three groups are separated by a maximum of only two years, it can be considered that for many aspects, generally speaking, their experiences and behaviors ought to be the same. A member who joined between September 1, 1990 and September 30, 1991 would, for example, have faced similar social and economic conditions as a member who joined between October 1, 1991 and September 30, 1992. Though important in a U.S. context, the Gulf War from 1990–1991 is not considered to be significant in the Australian context as only a very small number of Australian troops participated. Therefore, it can be assumed that the only major significant differences between the groups are what retirement scheme they participated in during their military service, and if they were on MSBS, and whether or not they had the option of selecting DFRDB.

The initial sample size was 8686 prior to data cleaning. From this initial sample 639 (7.53 percent) were in the DFRDB group, 4041 (46.52 percent) were in the group that could choose DFRDB or MSBS (labeled “choose DFRDB” and “choose MSBS”), and 1846 (21.25 percent) were in the group who were on MSBS with no choice (labeled MSBS-no choice). Of the initial sample 2160 (24.87 percent) observations did not contain the data on retirement scheme. This is due to the fact that, though the data sampling starts September 1, 1990, in most cases the retirement plan associated with a member was not recorded until July 1, 1994. As a result in most cases where the member had been discharged before July 1, 1994, no retirement plan was recorded. As the main purpose of this study is to identify the effect the retirement fund had on retention it was

necessary to drop these observations. By dropping all observations with a separation date prior to July 1, 1994, 2250 (25.90 percent) were removed. A further eight observations still had no retirement fund data; four of these were assumed to be in the MSBS-no choice group as they had enlistment dates after October 1, 1991, and the other four were dropped from the sample. A further three observations were dropped due to erroneous data: one variable with separation rank incorrectly labeled and two variables labeled DFRDB despite joining after the cut-off date. The final sample size is 6429 observations. Table 5 presents the summary statistics of the variables used in the analysis.

	All		Choose DFRDB		Choose MSBS		MSBS- No Choice	
	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
Variable	(1)		(2)		(3)		(4)	
Choose DFRDB	0.099	(2.983)	-		-		-	
Choose MSBS	0.616	(0.486)	-		-		-	
MSBS-No Choice	0.285	(0.451)	-		-		-	
Army	0.448	(0.497)	0.696	(0.460)	0.492	(0.500)	0.267	(0.442)
Navy	0.286	(0.452)	0.211	(0.408)	0.225	(0.418)	0.445	(0.497)
Air Force	0.265	(0.442)	0.093	(0.291)	0.283	(0.450)	0.288	(0.452)
Officer	0.287	(0.452)	0.269	(0.444)	0.257	(0.437)	0.358	0.479
Accession Age (years)	20.051	(3.280)	19.852	(3.351)	20.102	(3.324)	20.001	(3.157)
Separated	0.811	(0.391)	0.753	(0.432)	0.829	(0.377)	0.793	(0.405)
YOS-not including those still serving (years)	8.596	(4.585)	10.223	(6.082)	8.460	(4.365)	8.370	(4.392)
YOS-including those still serving (years)	11.143	(6.707)	13.246	(7.463)	10.852	(6.597)	11.045	(6.539)
Rank at time of Separation								
E00	0.017	(0.391)	0.021	(0.143)	0.021	(0.143)	0.006	(0.074)
E02	0.230	(0.421)	0.343	(0.475)	0.275	(0.446)	0.091	(0.037)
E03	0.266	(0.442)	0.178	(0.383)	0.226	(0.418)	0.385	(0.287)
E04	0.030	(0.170)	0.059	(0.235)	0.035	(0.185)	0.008	(0.487)
E05	0.284	(0.451)	0.280	(0.450)	0.282	(0.450)	0.290	(0.090)
E06	0.043	(0.204)	0.079	(0.271)	0.046	(0.209)	0.025	(0.454)
E07	0.0002	(0.014)	0.000	(0.000)	0.0003	(0.017)	0.000	(0.158)
E08	0.0004	(0.019)	0.000	(0.000)	0.001	(0.025)	0.000	(0.000)
O00	0.009	(0.094)	0.008	(0.091)	0.003	(0.058)	0.213	(0.000)
O01	0.002	(0.050)	0.000	(0.000)	0.002	(0.046)	0.004	(0.145)
O02	0.015	(0.120)	0.006	(0.079)	0.014	(0.116)	0.019	(0.064)
O03	0.095	(0.293)	0.015	(0.120)	0.084	(0.277)	0.145	(0.138)
O04	0.009	(0.093)	0.010	(0.102)	0.011	(0.102)	0.003	(0.352)
Observations	6429		635		3962		1832	

Table 5. Summary Statistics.

B. DESCRIPTION OF VARIABLES

1. Retirement Scheme

The summary statistics show that 9.88 percent were "choose DFRDB," 61.63 percent "choose MSBS," and only 28.50 percent were "MSBS-no choice." The DFRDB

groups represent 13.81 percent of the total for October 1, 1991, and September 30, 1991 that could choose either DFRDB or MSBS. This is fairly consistent with Little (1996), who reported that 85 percent of members with fewer than 10 years' service elected MSBS. As there was no significant change in recruiting if the sample was the entire population it would be expected that the "MSBS-no choice group" would be around 50 percent. No further information was obtained to explain this discrepancy.

2. Service Variables

The Army, Navy, and Air Force variables represent the service to which the observation was enlisted. These three services make up the entire ADF as Australia does not have a separate Marine Corps or Coast Guard. The "MSBS-no choice" group shows that Army only makes up 26.7 percent of the total group, where it would be expected to be closer to 50 percent as the Australian Army traditionally makes up at least half of the ADF. This indicates that of the missing observations in the "MSBS-no choice" group the majority would be Army members. Again the reason for the discrepancies is unknown and could not be explored further. As such any analysis should not make conclusions about individual service behaviors within the "MSBS-no choice" group. Despite this it is important to control for a member's service due to various unobserved effects that influence both retirement plan choice and retention. A significant unobservable factor would be peer influence as this would affect both retirement plan choice and retention. The service variable may act as a proxy for some of the affects of peer influence.

3. Officer Variable

The variable "Officer" represents all observations of those who were officers as opposed to enlisted ranks. Though 28 percent is fairly consistent with what is expected, the jump to 36 percent for the "MSBS-no choice" group is concerning as it would be expected to be similar to that of the whole group. Officers generally will have longer years of service than enlisted. Furthermore, due to the selection processes, officers generally have a higher education level, which is often linked to accounting for these effects.

4. Age Variable

"Accession age" is a variable that measures the age of the observation when the individual entered the data set. Though the distribution is very small, age is still an important factor as even a few extra years' work experience outside of the military is likely to have some effect on retirement plan choice.

5. Separated Variable

This variable indicates those in the sample who have separated from the service. Of the sample, 81 percent had separated; however, 19 percent were still serving with in excess of 21 years of service. Encouragingly, these figures are indicative of those from the 2012 ADF census. This variable is required as it denotes failure in the survival models detailed in Chapter IV.

6. Years of Service Variable

"YOS-not including those still serving (years)" represents the total years of service for all observations that had separated. Similarly, for "YOS-including those still serving (years)" represents the total years of service of all observations still in service. As almost all of the dropped observations had separated with a maximum of five years' service, the Separation age, Separated, and YOS will all be overestimated. As such any analysis should not be used to make conclusions about the behaviors in the first four years of service. When comparing the YOS means of the three groups it was found that the differences between means of the groups when compared against each other were statistically significant. As stated previously, due to the dropped data the magnitude of these means is inconsequential; however, the differences are important to note. On average this difference was approximately two years (1.790836 years) higher for those on DFRDB. This supports the assumption that those on DFRDB are more likely to complete 20 years of service, which results in the higher average. This variable is the key variable when determining retention behaviors.

7. Rank at Time of Separation Variable

The "Rank at Time of Separation" variables "E00"–"O04" represent the rank at which the observation separated from the service. Similarly, as for age these variables contain a total of 1214 missing observations, as they had not yet separated. The E00-2 and O00-3 ranks will be underestimated as these are ranks that a member would not achieve in four years. Any analysis should be sensitive to the overestimation and underestimation issues. This variable is nearly collinear with the officer variable. The few differences between these variables are based on those observations that switched from enlisted to officers (less than two percent). It is therefore used in the analysis as an alternative to the "officer" variable as it also controls for some aspects of performance such as accelerated promotion. As it only indicates the rank upon separation it only shows if at the time of separation the observations were above or below their peers. Additionally slightly different rank structures at the enlisted level mean that care should be taken if comparing any results of this variable directly to the U.S. military.

Despite some obvious errors within the sample it is sufficient to conduct preliminary analysis on the retention behaviors of those members on DFRDB or MSBS. Any significant results should be tempered by the fact that they will need to be followed up with more rigorous data before any firm conclusions are made.

IV. METHODOLOGY AND DISCUSSION OF RESULTS

A. METHODOLOGY

The analysis first explores the separation trends of each group, using kernel densities, which estimate the probability density function that an observation will separate at a particular time. This was done for three groups: those that choose DFRDB ("DFRDB"), those that choose MSBS ("choose MSBS") and those on MSBS with no choice ("MSBS-no choice"). Kaplan-Meier survival analysis is utilized to compare the separation rates over time. Although the interpretation of the results is similar to that of the kernel densities, the alternative format allows for a direct comparison of the results with existing literature.

Ordinary Least Square regression (OLS) analysis is used to closely examine the trends shown in the kernel densities and survival analysis estimates. This allows for control of the observed variables, which affected both separation rates and retirement scheme choice. A regression was done, with each year of service being the dependent variable, with the control group as DFRDB, such that:

$$YOS(t)_i = \beta_0 + \beta_1 \text{`choose MSBS'}_i + \beta_2 \text{`MSBS-no choice'}_i + \beta_i X_i + \varepsilon$$

"YOS(t)" is a binary variable indicating when an observation (i.e., a member) separated after "t" years. The coefficients β_1 and β_2 represent the probability that an observation will separate at year "t" when compared to a member on DFRDB. The other X_i variables include: Gender (males being the control), Service (Army being the control), Accession Age, and Rank at Time of Separation (E01 being the control). The error term will contain the unobserved effect that influence years of service; this may include things such as deployment history; however, in most cases this will not affect the results as they have no effect on the retirement plan choice. Possible unobserved variables that may influence the result include:

- Ability—A service member's general ability to understand and correctly interpret the best outcome of any choice is likely to affect both the choice and the time when the service member chooses to separate.

- Corp/Trade (equivalent to U.S. Military Occupation Specialty)—This may be a proxy for ability; however, it also would have a significant effect on YOS as particular trades have varying career profiles and opportunities.
- Initial posting history—Due to factors such as peer effects it is feasible that a member's posting locality at the time of the choice is likely to affect the retirement plan choice and also be a proxy for such corps/trade.
- Individual financial circumstances—A member with considerable other income is likely have different financial considerations that will effect both retirement plan choice and YOS.

Despite the unobserved variables they will only have an effect on the group that could choose between DFRDB and MSBS. These factors will not change the fact that a member who joined after October 1, 1991 was on MSBS. As such I compare the differences between the two MSBS groups in a separate regression; those who choose MSBS were assigned as the control group, such that:

$$YOS(t)_i = \beta 0 + \beta 1 \text{`MSBS-no choice'}_i + \beta i X_i + \varepsilon : \text{if retirement scheme was MSBS}$$

The regressions were completed for each year of service, ranging from five through 21 years. Due to the sample restrictions detailed in Chapter III, the initial four years were not analyzed. Also due to issues detailed in Chapter III, the analysis focuses on the trends and the sign of statistically significant results, as opposed to the magnitude. This allows for general hypotheses to be made about the results, with the caveat that further robust analysis will need to be conducted in order to confirm those hypotheses. A summary of the OLS results are presented in this chapter; however, the full results are presented in Appendix C.

B. RESULTS

1. Kernel Densities

Figure 1 shows the kernel densities of the four groups. A Kolmogorov-Smirnov test suggests that all densities are significantly different at the 95 percent level. While this is expected with the DFRDB group, it is not necessarily expected between the MSBS groups. This is further investigated and with the OLS analysis.

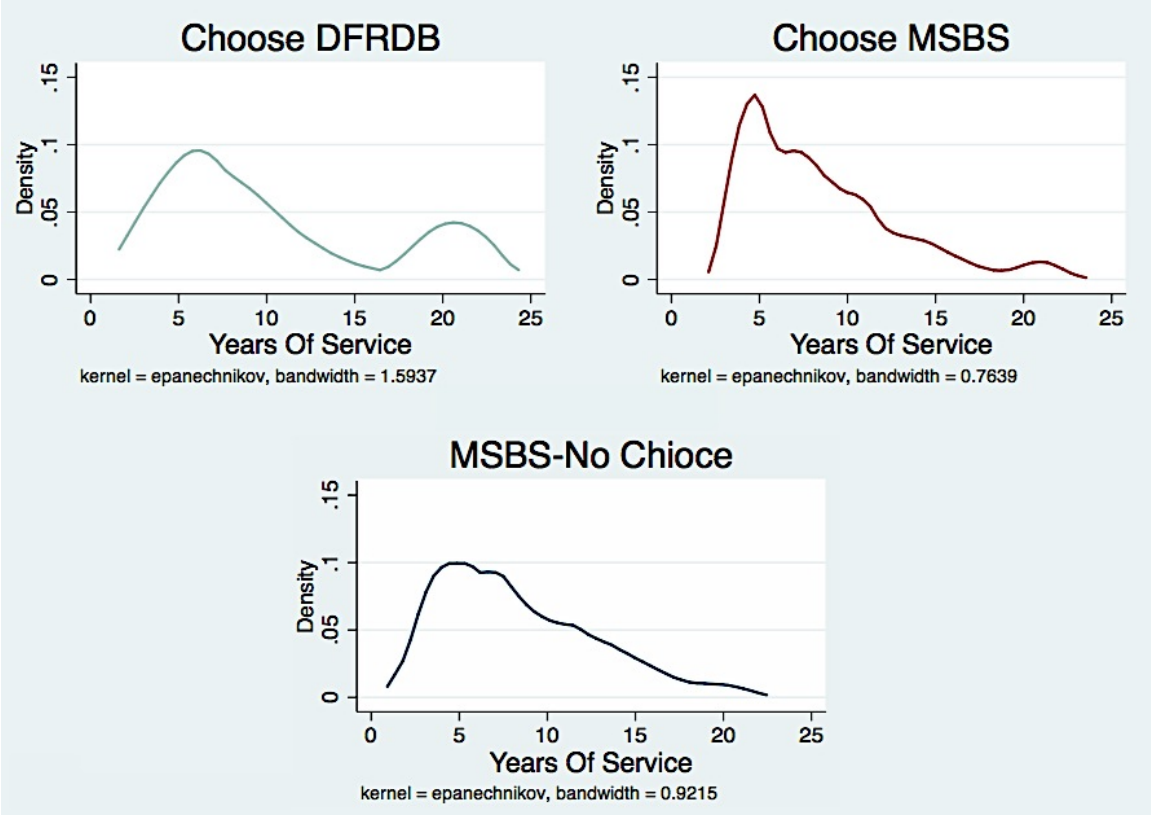

Figure 1. Kernel Densities.

It is clear that the DFRDB groups exhibit two distinct periods with high separation rates. The first of these occurs at the seven- to eight-year mark, and the second occurs at the 20-year mark. These distinctions are also present in the MSBS groups; however, the seven to eight year period of high separation is more defined than that at the 20-year mark. Furthermore, the 20-year mark is even less defined in the "MSBS-no choice" group. The spike at seven to eight years of service is expected in all groups as it is between four and six years, which is when the initial period of minimum service expires, and as such a member makes a choice to stay or go. Due to the restrictions in the data prior to five years of service, some measurement error is expected, providing a probable explanation for the spike at seven to eight years. Notably, these trends also support the premise that once the choice to stay on DFRDB was made, the members were more likely to commit to stay for 20 years of service. The more defined spike for MSBS members also suggests that fewer members on DFRDB separate at this point. However, once they reach 20 YOS, the DFRDB members have a greater incentive to leave.

As mentioned previously, the MSBS scheme has a bonus at 15 YOS (the equivalent of one year's salary, taxed). Possible evidence of the effect of this bonus is seen in the profile of the members who could choose MSBS. The propensity to leave flattens around the 12- to 15-year mark and then drops until the 20-year mark, when it rises again—suggesting that after 15 YOS members are less inclined to separate until 20 YOS. This trend, however, is not present in the group of observations on MSBS who could not choose. A possible reason for this is that the group with a choice was more aware of the bonus much earlier in their careers, and that this was one of the factors they considered when choosing MSBS or DFRDB. While members of the second group were most certainly aware of the bonus, it was not a consideration until much later in their service, and as such they may not have been as likely to commit as their counterparts. This hypothesis may support the conclusion that the 15-year bonus had little effect on those already intending to serve 20 years. A study in 1996 made similar conclusions, using surveys as a means to gather respondents' views on the retention bonus. In this study, Little (1996) concluded that only "a third of all MSBS respondents see the retention bonus as an incentive for continued service beyond the 10- to 15-year mark" and "two thirds of all MSBS members are either disinclined towards or unsure about continued service without the incentive of a retention benefit." Further analysis by the ADF is recommended because if this hypothesis were correct, it suggests the resources used to administer and pay the bonus may be better served elsewhere.

2. Survival Analysis

Survival estimates as shown in Figure two emphasize the effect that 20 years of service has on the retention behavior of those on DFRDB. Figure three is extracted from Warner (2008) and demonstrates the similarities of DFRDB and the U.S. system. MSBS, in contrast, has a much smoother survival rate.

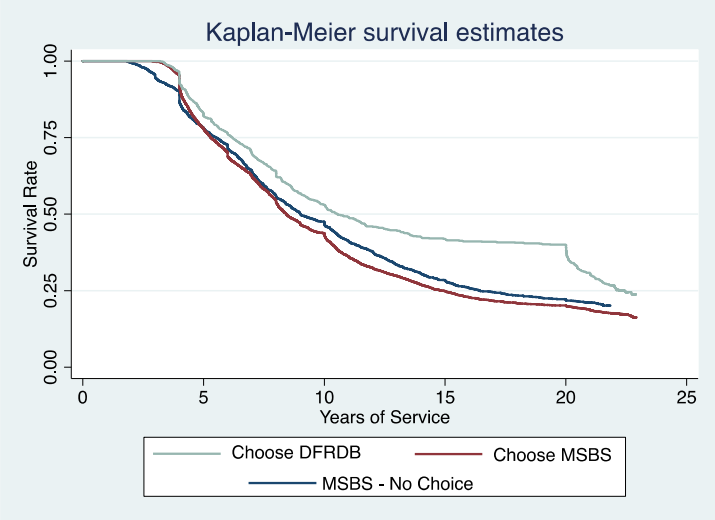

Figure 2. Survival Estimates.

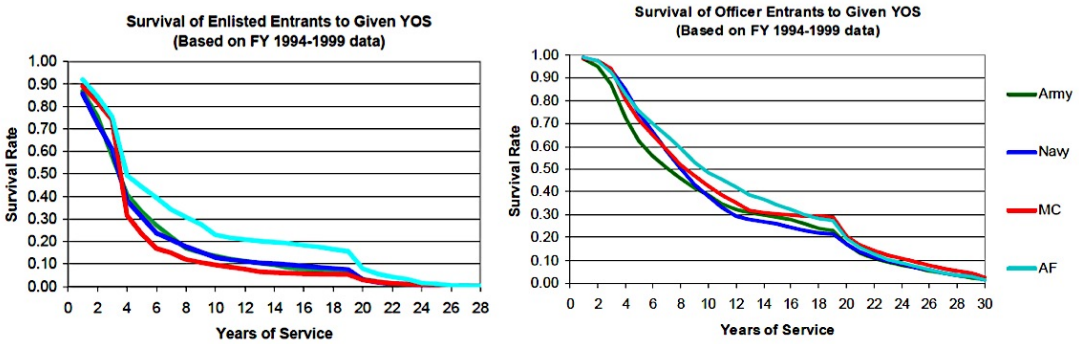

Figure 3. U.S. Survival Estimates (from Warner, 2008).

In the case of the U.S., Warner (2008) argues that involuntary separations between 10 and 19 years of service are seen a "break of faith" as the individual has already made a financial decision, even though the service member is not officially vested in the retirement system. Though there are still some significant decision points that are discussed in the following sections, Figures one, two and three show that MSBS is an alternative that allows for this greater flexibility, without creating the tension that involuntary separations do in schemes such as DFRDB or the current U.S. retirement system.

3. Regression Analysis

Table 4 shows the OLS regression estimates of YOS(t) and allows for comparison and further dissection of the results in the kernel densities and survival estimates.

YOS	Choose MSBS (Compared to DFRDB)	MSBS- No Choice (Compared to DFRDB)	MSBS- No Choice (Compared to 'Choose MSBS')
5	0.018	-0.003	-0.014
6	-0.003	0.024	0.011
7	0.019	0.012	0.005
8	-0.014	-0.029	-0.016*
9	-0.016*	-0.021*	-0.006
10	0.036***	0.016	-0.020**
11	0.003	-0.003	-0.006
12	0.016*	0.043***	0.027***
13	0.016	0.014	0.003
14	0.017***	0.017***	0.000
15	0.019**	0.021**	0.002
16	0.009	0.010	0.001
17	0.006*	0.010*	0.004
18	-0.001	0.004	0.005**
19	0.000	0.001	0.002
20	-0.103***	-0.109***	-0.003
21+	-0.062***	-0.077***	-0.014***

***** p<0.01, ** p<0.**05, * p<0.1

Table 6. Summary of Regression Estimates.

As previously stated, despite similar trends between the two MSBS groups, the Kolmogorov-Smirnov test showed a significant difference between the two. The most meaningful differences between the MSBS groups are at 10 and 12 years of service. This is more apparent when the groups are also compared with DFRDB, as the "choose MSBS" group is statistically significant where the "no-choice" MSBS group is not. Possible explanations for these differences include Australia's major deployment to East Timor in 1999, members becoming vested in long service leave after 10 years of service (three months paid leave), and the September 2001 terrorist attacks:

- In 1999, the Australian Defence Force deployed over 5000 personal in support of the International Force East Timor, the largest deployment of the Australian military since Vietnam.
- After 10 years of service members of the Australian Defence Force are vested with long service leave in the form of three months paid leave. The group who chose MSBS joined between September 1990 and October 1991.

In the year 2000–2001, these two events marked significant career milestones for the "choose MSBS" group. As this group joined in September 1990–October 1991 it represented September 2000–October 2001. Though these events are also significant milestones for the MSBS-"no choice" group, the long-service leave milestone would have been achieved in 2002–2003. During this post-September 11 period, there was a marked period of uncertainty about Australia's commitment to the War on Terror. Though Australian Special Forces were deployed to Afghanistan post-September 11, the majority of conventional forces did not see significant deployments until Iraq 2003, and even then, significant troop numbers were committed only until 2005.

The 12 YOS period sees the MSBS-"no choice" group separate at higher rates. As such it is hypothesized that one to two years post-September 11, there existed enough uncertainty to limit the separation rate of all groups. Once it became apparent that large troop deployments were not likely, those who would have separated in this period did so in 2003; this is most significant for the MSBS-no choice group as they would have normally separated at higher rates at the 10 YOS point. In order to fully test this hypothesis, more data would be required, including deployment histories. The other significant differences may also suggest differing behaviors due to the ability to choose. It is feasible that those who chose MSBS were also more aware of their retirement plan and were able to make more informed choices. Again this hypothesis requires further investigation.

When comparing MSBS to DFRDB, the differences are more defined. Initially at eight and nine years of service, those on DFRDB are more likely to separate. This is intuitive, because if a member has not committed to serve for 20 years, the member will find continued service economically less viable under DFRDB. It would be expected that those on DFRDB would leave shortly after the initial minimum period of service. This

possibility is increased at the eight and nine YOS service mark, as the data does include the first five years when a much higher separation rate would be expected. This is in connection to the East Timor factor as described earlier.

After the post-September 11 period the DFRDB group is less likely to leave than the two MSBS groups. This remains the case up until the 20 YOS period when the DFRDB group separates at significantly higher rates. This behavior is expected and is also discussed with reference to the kernel densities and survival estimates. One fact to consider when looking at the differences between DFRDB and MSBS is that the members had to make a choice in the first year of service. It can be surmised that some members who made the choice for DFRDB committed themselves to a 20 year career in that first year of service. If this premise were accurate, it would be an argument against offering choice (colloquially referred to as "grandfathering") between the current U.S. retirement system and one similar to MSBS, where members are vested very early on in their career. Natural attrition will also occur within the military; ideally the attrition should be of those members who are not suited to continue. This sorting through natural attrition and non-direct retention tools, such as promotion and job placement, allows the military to encourage the members best suited to remain, while encouraging those unsuited to leave. By forcing a decision of a 20 year career on an individual before either the individual or the organization has had a chance to assess their long-term performance may possibly lead to a glut of unsuited members that normally would have left service.

Despite restrictions with data, the analysis does provide some insight into the Australian Defence Force's transition from DFRDB and MSBS. Though the data was not obtained for this study, it may be feasible to conduct more robust analysis on the MSBS retention bonus and the effect of grandfathering. These two particular points will be of great value to U.S. policy makers.

V. SUMMARY AND CONCLUSION

A. SUMMARY

Australia's experience in retirement change over the past 23 years provides a foundation through which the United States may examine and gain insight from implementation of the DFRDB plan (being in general equivalent to the current High-3 plan). The Australian MSBS plan presents an option that the U.S. could possibly use as a model for replication; however, more importantly, the U.S. may consider the lessons learned from the change and how the change affected the behavior of service members. In order to compare the military systems I first conducted a review and comparison of the general retirement provisions in both Australia and the U.S. This then allowed me to discuss the military retirement systems and draw out the relevant policy lessons for the U.S. Finally, an empirical analysis was conducted on the last cohort of members that could choose DFRDB and MSBS and the first cohort of those that were on MSBS with no choice.

1. Comparison of General Retirement Provisions

When examining retirement it is important to look at all aspects of how retirement plan choices affect behaviors. This is even more apparent when comparing countries such as Australia and the U.S. This paper first looks at the general construct behind both publicly and privately funded retirement plans; though with a cursory view it may appear that the constructs are dissimilar, further analysis shows they are in fact quite similar. Australia's relatively modest public pension is supported by mandatory private retirement. From a macro level due to the mandatory nature of the employer contributions it is similar to a publicly funded system wherein capital is coming from taxes on the employer, such as the U.S. social security insurance system. As such this ersatz private retirement can be viewed as similar to a state funded system, though it does present an individual with more flexibility and control over his investment than a traditional public scheme. Although Australia does have an additional flat rate reducing pension, this is designed as a safety net for low-income earners and is similar to the redistributive nature

of the U.S. social security insurance. Any retirement payment by employers above the mandatory minimum is similar to U.S. private retirement plans, with the employer looking to gain benefits from recruitment and retention by providing compensation incentives other than straight salary increases. Australia, like the U.S., provides various tax incentives for employers and employees to contribute toward retirement plans. It is important to note that benefits such as health care, career transition support and other compensation incentives have considerable impacts on retirement behaviors. Though not discussed in detail in this paper, these benefits and incentives must be part of the discussion when the U.S. policy makers make comparisons with other countries and decisions on U.S. military retirement.

2. Comparison of Military Retirement Systems

With the general construct of Australian and U.S. public and private retirement concluded to be based on similar grounds with similar structures, it is now possible to conduct a comparison between the military retirement systems. As discussed earlier, though the Australian and U.S. militaries are very different in size, the social dynamics of the two countries and the military structures of the two all-volunteer forces are very similar, and as such, it is feasible to suggest that behaviors exhibited by the ADF due to retirement change may be similar to those that the U.S. could expect. DFRDB and the U.S. High-3 are based on very similar constructs.

The main differences between the two are:

- A 5.5 percent contribution is required by all DFRDB members. If members leave the military prior to 20 YOS they receive back their contribution with no indexing or interest. The U.S. members do not contribute to their retirement plan;
- The pension amounts as a percentage of average salary are higher for the U.S. For example, after 20 YOS a U.S. military member would receive a pension equivalent to 50 percent of the final highest three-year average salary whereas the ADF member would receive 35 percent of the final yearly salary; and
- U.S. military members have the REDUX option where they can choose to have a reduced pension amount in exchange for a $30000 bonus at 15 YOS, with a commitment to complete at least 20 YOS.

The changes of the entire Australian retirement paradigm in the late 1980s led to the introduction of MSBS where members were vested in a defined benefit after only one year of service. However, importantly, they were not able to access the defined benefit until reaching retirement age and leaving the workforce regardless of YOS or at what age they left the military. The MSBS plan has two parts. The first is the "member benefit" funded by a mandatory five percent contribution (similar to the 5.5 percent DFRDB contributions) with additional contributions up to 10 percent. These contributions were paid into a investment account where members receive back their contributions and any interest based on market conditions at 65 years old. The second is the "employer benefit" which is a government funded defined benefit based on a formula using YOS and the final three-year average salary with increases within the formula at each year of service until seven and then again at 21 YOS. This is paid as a lump sum, a pension, or combination of both and is available to members at 55 years old and upon leaving the workforce. MSBS was introduced in September 1991 with all new entrants to the ADF being compulsory members of the plan. Those members who were serving prior to September 1991 had to a make choice between September 1991 and September 1992 whether to stay on DFRDB or to switch to MSBS.

B. LESSONS LEARNED

The primary research goal of this thesis was to identify lessons that can be learned from the Australian experience of changing its military retirement plan and how those lessons apply to the U.S. military. The principal conclusion of this paper is that a change in the ADF retirement plans did in fact have a considerable effect on the retention behaviors of service members. A limitation of this paper is that, even though different behaviors were noted, it is not possible to determine if this factor had an improvement on the quality of people who continued serving when compared with DFRDB. Specifically the conclusions can be summarized as: complexity, effectiveness of retention levers (MSBS bonus and long service leave), smooth retention behaviors, and grandfathering.

1. Complexity

When considering retirement plans as a whole with complexities such as taxation, the MSBS plan adopted by Australia is very complex; this assertion is also supported by Podgers et al. (2007). Initially, this complexity may have had significant impacts on participants who were forced to make a decision between MSBS and DFRDB. Not only did they need to make long-term decisions about future careers, they did so with a reliance on the information given to them by the system. After this decision was made, various taxation regulations and changes over the past 20 years have meant it has become very difficult for ADF members to make truly informed choices about their retirement. This is a lesson that can be learned by the U.S. Firstly, any new proposals where U.S. service members have options between plans should be simple and associated with appropriate documentation explaining all associated risks and methods for members to calculate the real value of their choices. With the aid of modern software applications this could be achievable. Furthermore, though regulatory changes cannot always be avoided, policy makers can attempt to minimize their impacts.

2. MSBS Retention Benefit

Though due to data limitations it could not be substantiated, it is interesting to note the analysis suggests that the MSBS retention benefit may not influence retention behavior beyond 15 years. It is hypothesized that those committed to do 20 years' service will do so with or without the retention bonus. This was first investigated by Little (1996) through the use of a survey. He suggested a similar hypothesis with up to two-thirds being disinclined or unsure if the MSBS retention benefit would influence their choice to serve beyond 15 years. Further analysis with more data is needed to confirm this hypothesis; however, if it were to be substantiated, it would represent a significant portion of funding that may be better served elsewhere.

3. Long Service Leave

Despite the possible lack of significance of the MSBS retention bonus, there did appear to an effect around the 10-year mark. As detailed previously, this could be due to

a combination of factors; however, of most interest and warranting further investigation is the entitlement of three months' paid long-service leave at 10 YOS.

4. Smooth Separation Rates

Due to the vesting of MSBS members after only one year of service, the kernel density and survival analysis showed smooth separation rates compared with the sharp peaks at 20 years experienced by DFRDB and the U.S. system. This smooth separation rate can allow for more flexibly using other retention mechanisms (such as bonuses) based on the needs at particular times and also targeted at certain trades or rank groups.

5. Grandfathering

There were some significant differences between the group that could choose MSBS and the group that had no choice. This could just be a measurement error or it could also suggest significantly different behaviors due to the ability to choose. It is feasible that those who were forced to make choice were therefore required to make plans about their future careers much earlier than those who were not, hence affecting their behavior. It is also feasible that those who chose MSBS were also more aware of their retirement scheme and were able to make more informed choices. These hypotheses require further investigation. However, they provide an interesting discussion when considering changes to the U.S. policy. For example, should all serving members be given a choice? Should the choice be limited to those with at least 10 or 15 YOS? Should service members be given a choice at all? When and if choices are offered is likely to be a controversial issue if the U.S. does move with significant changes to their military retirement. This paper shows that offering the choice may have a significant affect on service members' behaviors, and as such, the results suggest that further investigation is warranted.

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APPENDIX A. COMPARISON OF RETIREMENT SYSTEMS

<table>
<tr><th></th><th>Australian–DFRDB</th><th>Australian–MSBS</th><th>U.S.–High 3</th><th>U.S.–REDUX</th></tr>
<tr><td>Commencement</td><td>1972</td><td>1991</td><td>2000: Though has existed in similar forms since 1948</td><td>1986: Though current arrangements were introduced in 2000</td></tr>
<tr><td>Completion</td><td>30 Sep 91 (for new members only)</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Member's contribution</td><td>5.5%</td><td>5%

Member can choose to contribute up to 10% in 1% increments</td><td>Zero</td><td>Zero</td></tr>
<tr><td>Vested after</td><td>20 YOS

In special circumstances a small number of members may be entitled after 15 YOS</td><td>1 YOS

Define Benefit (DB) payable at a reduced rate until 7 YOS when 100% is payable

<table><tr><td>YOS</td><td>% of DB</td></tr><tr><td>>1</td><td>0</td></tr><tr><td>1</td><td>10</td></tr><tr><td>2</td><td>20</td></tr><tr><td>3</td><td>30</td></tr><tr><td>4</td><td>40</td></tr><tr><td>5</td><td>50</td></tr><tr><td>6</td><td>75</td></tr><tr><td>7</td><td>100</td></tr></table></td><td>20 YOS</td><td>15 YOS

With a commitment to complete 20 YOS</td></tr>
</table>

<table>
<tr><th></th><th>Australian–DFRDB</th><th>Australian–MSBS</th><th>U.S.–High 3</th><th>U.S.–REDUX</th></tr>
<tr><td>Defined benefit</td><td>Pension based on final salary (FS). Payable immediately upon separation.

<table><tr><td>YOS</td><td>% of FS / year</td></tr><tr><td>20</td><td>35.00</td></tr><tr><td>25</td><td>42.50</td></tr><tr><td>30</td><td>51.25</td></tr><tr><td>35</td><td>62.75</td></tr><tr><td>40</td><td>76.50</td></tr></table></td><td>Lump sum or pension based on average of final three salaries (FAS3). Payable from age 55.

<table><tr><td>YOS</td><td>% of FAS3</td></tr><tr><td>0-7</td><td>18.00</td></tr><tr><td>8-20</td><td>23.00</td></tr><tr><td>21+</td><td>28.00</td></tr></table>E.g., member serves for 22 years with a FAS3 of 50 000
DB = (7 * 0.18 * 50 000) + (13 * 0.23 * 50 000) + (2 * 0.28 * 50 000) = $240 500
Pension calculated by dividing lump sum by a factor of 12 for a 55-year-old and down to 10 for a 65-year-old.</td><td>Pension based on average highest 36 month salaries (High 3). Payable immediately upon separation.

<table><tr><td>YOS</td><td>% High 3 / year</td></tr><tr><td>20</td><td>50.00</td></tr><tr><td>25</td><td>62.50</td></tr><tr><td>30</td><td>75.00</td></tr><tr><td>35</td><td>75.00</td></tr><tr><td>40</td><td>75.00</td></tr></table></td><td>$30000 lump sum at 15 years
Pension based on average highest 36 month salaries (High 3). Payable immediately upon separation.

<table><tr><td>YOS</td><td>% High 3 / year</td></tr><tr><td>20</td><td>40.00</td></tr><tr><td>25</td><td>57.50</td></tr><tr><td>30</td><td>75.00</td></tr><tr><td>35</td><td>87.50</td></tr><tr><td>40</td><td>75.00</td></tr></table></td></tr>
<tr><td>Option to Commutate (i.e., lump sum payment instead of pension)</td><td>Up to five times the annual pension amount. Pension is reduced by a factor based on member’s age and life expectancy.</td><td>100% of DB at 65 years old is the default payment

From 55 years old members can choose to have between 50% and 100% of the DB paid as a pension.</td><td>N/A</td><td>N/A
Though $30000 bonus received at 15 YOS.</td></tr>
</table>

	Australian–DFRDB	Australian–MSBS	U.S.–High 3	U.S.–REDUX
Indexing arrangements	Payments indexed yearly in accordance with CPI.	Upon discharge 3% of the DB is transferred into an investment fund and accrues interest in accordance with fund performance. Remainder is indexed yearly in accordance with CPI.	Payments indexed yearly in accordance with COLA, which are based on CPI.	Payments indexed yearly at a rate of one percent less then the COLA.
Defined Contribution/ Personal Savings	Government invests the equivalent of three percent of salary each year into a managed fund and only available to the member upon retirement age (known as 'Productivity Benefit'). When leaving the military the accrued amount (with interest) is transferred to private superannuation fund. Member can choose to participate in 'Military Super' investment fund through additional 'ancillary' or spouse contributions attracting no administration fee.	Member's contributions invested in 'Military Super' investment fund. Member can change between five investment strategies; cash, conservative, balanced, growth, and high growth. At 65 years old member can access full amount with accrued interest. Member can choose contribute additional 'ancillary' or spouse contributions attracting no administration fee	Member can choose to participate in a federal TSP. Unlike other federal employees no matching is given by the government; however, members can take advantage of higher amounts allowed as tax deferred payments when compared with other private retirement savings plans.	Same as High 3.

Table 7. Comparison of Australian and U.S. Military Retirement.

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APPENDIX B. FISCAL COMPARISON OF DFRDB AND MSBS

Chapter II presented the following table to represent an indicative enlisted member and the variances between DFRDB and MSBS:

	DFRDB		MSBS	
YOS	**Total Benefits Received**	**Total Government Contribution**	**Total Benefits Received**	**Total Government Contribution**
20	982408	982408	853607	508182
25	1089452	1089452	1103903	635630
30	1179463	1179463	1313928	710868
35	1248759	1248759	1357672	770797

Table 8. DFRDB MSBS Comparison Example.

This example is of an enlisted member having joined the Australian Army in 2013 and serving a 20–35 year career. Though in the context of this paper it may have been better to use an example of a member who joined in 1991–1992, it was not possible to find all the relevant information to make sound assumptions. Even with the assumptions used in this example it is impossible to come up with a generic 'one size fits all' example, as there are so many variables that can change or are based on individual decisions. As such, this table should only be viewed in the context of one possible outcome.

A pamphlet, "DFRDB or MSBS: A Comparison" (1991) available on the Australian Defence Force Welfare Association website, was analyzed and it gave examples to help the decision making of currently serving members considering the switch to MSBS in 1991. It was found that this was not sufficient for the purposes of this paper. The pamphlet did not give details of how some of its calculations, such as "member contribution," were derived. As discussed in Chapter II the rate at which a member is promoted through the ranks can have a significant effect on the final outcome, such that two members retiring with the same years of service at the same rank can have very different amounts. Though the pamphlet used some detailed assumptions, as

explained in the following list, they differ from the ones used in this paper. The comparison pamphlet also only presented what the member would receive immediately as he or she separated from the Defence Force; this does not allow for a comparison of total amounts received by the DFRDB pension over a lifetime. A change in 1996, which made it mandatory to keep all employee contributions in an investment fund until retirement from the workforce, also significantly changed values that are presented in the pamphlet. Though this change would not have affected the decision to stay on DFRDB or MSBS in 1991, it would have made significant differences to the final amounts payable to all those serving past 1991. The information currently offered to service members does not detail any assumptions with the example it presented (Commonweath Superannuation Corporation 2011). As such the assumptions used in Tables two and eight were as follows:

- All values are in Australian dollars; five year average exchange rate

  $1.00 US = $0.94 AU and 20 year average exchange rate $1.00 US = $0.77 AU (OzForex Group Ltd., 2014).
- Final yearly salaries used were from the 2013 ADF Pay and conditions manual.
- The promotion profile was five at years private, three years at lance corporal, five years at corporal, six years at sergeant, seven years at warrant officer class two, four years at warrant officer class one (A), three years at warrant officer class one (B) and three years at warrant officer class one (C).
- The member started at pay group one and increased a pay group at each promotion with an extra pay group increase at PTE-3 years and CPL-3 years.
- This promotion and pay group profile is anecdotal and will vary significantly for each member based on a variety of factors that include, but are not limited to, service, trade (MOS or Corps), and individual performance.
- A market return rate of seven percent was used; in reality this rate would vary based market conditions and the investment strategy of the individual.
- An MSBS member only invested the minimum mandatory five percent contributions.
- A CPI rate of 3.5 percent was used.

- All calculations were adjusted to be equivalent to that of 20 YOS where the rate is equal to CPI.
- The member enlisted at 20 years of age with a life expectancy of 80 years of age.
- The member retired from the work force at 65 years old.
- Member was taxed at 2013 marginal tax rates with a 10 percent offset at age 65 where applicable.
- A DFRDB member continued to earn a wage in the same tax bracket as his or her final military wage upon leaving the defence force; as such the DFRDB pension is taxed accordingly.
- An MSBS member chose to receive the employer benefit as a pension.
- Other than MSBS or DFRDB a member did not receive any other taxable income after 65; though more than likely a member would have additional assets or income based on employment after military service, the variance of this between individuals is too difficult to generalize.

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APPENDIX C. REGRESSION RESULTS

Tables 9 through 12 compare with the three retirement choice groups DFRDB (control group), those that could choose MSBS (cMSBS) and those who were on MSBS with no choice (nMSBS) such that:

$$YOS(t)_i = \beta_0 + \beta_1 \text{`choose MSBS'}_i + \beta_2 \text{`MSBS-no choice'}_i + \beta_i X_i + \varepsilon_i$$

Tables 13 through 16 compare with only those on MSBS where those that could choose MSBS were the control group such that:

$$YOS(t)_i = \beta_0 + \beta_1 \text{`MSBS-no choice'}_i + \beta_i X_i + \varepsilon_i$$

if retirement scheme was MSBS.

VARIABLES	YOS(5)	YOS(6)	YOS(7)	YOS(8)
cMSBS	0.0176	-0.00227	0.0186	-0.0141
	(0.0139)	(0.0142)	(0.0150)	(0.0136)
nMSBS	0.00343	0.00850	0.0240	-0.0293*
	(0.0154)	(0.0158)	(0.0166)	(0.0150)
Female	0.0186*	0.00745	0.00441	-0.000719
	(0.00983)	(0.0100)	(0.0106)	(0.00958)
Army	-0.00615	-0.0250**	-0.0348***	-0.0408***
	(0.0124)	(0.0127)	(0.0134)	(0.0121)
Navy	0.0106	-0.0283**	-0.0136	-0.0340***
	(0.0111)	(0.0113)	(0.0119)	(0.0108)
acc_age	0.000550	0.00416***	-0.00247*	-0.00283**
	(0.00120)	(0.00123)	(0.00129)	(0.00117)
E02	0.0103	0.0540**	0.0565**	0.0574**
	(0.0255)	(0.0260)	(0.0274)	(0.0248)
E03	-0.00832	0.0697**	0.0211	0.0318
	(0.0268)	(0.0274)	(0.0288)	(0.0261)
E04	0.0559*	0.0805**	0.116***	0.105***
	(0.0330)	(0.0337)	(0.0355)	(0.0321)
E05	-0.0938***	0.0240	0.0656**	0.104***
	(0.0258)	(0.0263)	(0.0278)	(0.0251)
E07	-0.131***	-0.0486	-0.0553*	-0.00503
	(0.0308)	(0.0315)	(0.0332)	(0.0300)
EO8	-0.130	-0.0868	-0.0222	1.019***
	(0.282)	(0.288)	(0.303)	(0.274)
O00	-0.136	-0.0618	-0.0415	0.000160
	(0.200)	(0.204)	(0.215)	(0.195)
O01	-0.0586	-0.00510	-0.0665	0.0306
	(0.0482)	(0.0493)	(0.0519)	(0.0470)
O02	-0.0497	0.0109	-0.0819	-0.0367
	(0.0819)	(0.0836)	(0.0881)	(0.0798)
O03	0.00387	0.106**	-0.0121	0.0883**
	(0.0404)	(0.0412)	(0.0435)	(0.0394)
O04	-0.0994***	-0.0150	0.0159	0.0886***
	(0.0277)	(0.0283)	(0.0298)	(0.0270)
Constant	0.102***	-0.0125	0.114***	0.122***
	(0.0385)	(0.0393)	(0.0414)	(0.0375)
Observations	5,215	5,215	5,215	5,215
R-squared	0.034	0.018	0.014	0.024

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9. Regression of All Groups; 5–8 YOS.

VARIABLES	YOS(9)	YOS(10)	YOS(11)	YOS(12)
cMSBS	-0.0160*	0.0357***	0.00258	0.0160*
	(0.00945)	(0.0135)	(0.0101)	(0.00910)
nMSBS	-0.0205**	0.0164	-0.00329	0.0431***
	(0.0104)	(0.0149)	(0.0112)	(0.0101)
Female	-0.000976	-0.00256	0.00502	-0.00760
	(0.00666)	(0.00950)	(0.00714)	(0.00641)
Army	-0.00325	-0.0154	0.0282***	0.0196**
	(0.00842)	(0.0120)	(0.00903)	(0.00811)
Navy	-0.00569	0.00371	0.00761	-0.0138*
	(0.00750)	(0.0107)	(0.00804)	(0.00722)
acc_age	0.00122	-0.00135	6.51e-05	-0.000102
	(0.000813)	(0.00116)	(0.000872)	(0.000783)
E02	0.0276	0.00176	-0.0328*	-0.0427**
	(0.0172)	(0.0246)	(0.0185)	(0.0166)
E03	0.0239	-0.0134	0.00324	-0.0141
	(0.0181)	(0.0259)	(0.0195)	(0.0175)
E04	0.0441**	-0.000170	-0.00950	-0.0326
	(0.0223)	(0.0318)	(0.0239)	(0.0215)
E05	0.0603***	0.120***	0.0559***	0.0256
	(0.0175)	(0.0249)	(0.0187)	(0.0168)
E07	0.0309	0.105***	0.0605***	0.0928***
	(0.0209)	(0.0298)	(0.0224)	(0.0201)
EO8	-0.0105	-0.0271	-0.0423	-0.0465
	(0.191)	(0.272)	(0.205)	(0.184)
O00	-0.00162	-0.0351	-0.0444	-0.0434
	(0.135)	(0.193)	(0.145)	(0.130)
O01	0.00633	-0.0347	-0.0283	-0.0274
	(0.0327)	(0.0466)	(0.0350)	(0.0315)
O02	0.00270	0.0296	-0.0144	0.0376
	(0.0555)	(0.0791)	(0.0595)	(0.0534)
O03	0.0300	0.0110	-0.0279	-0.0416
	(0.0274)	(0.0390)	(0.0293)	(0.0263)
O04	0.0730***	0.0712***	0.0639***	0.0302*
	(0.0187)	(0.0267)	(0.0201)	(0.0180)
Constant	-0.00723	0.0478	0.00957	0.0140
	(0.0261)	(0.0372)	(0.0280)	(0.0251)
Observations	5,215	5,215	5,215	5,215
R-squared	0.012	0.048	0.028	0.037

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10. Regression of All Groups; 9–12 YOS.

VARIABLES	YOS(13)	YOS(14)	YOS(15)	YOS(16)
cMSBS	0.0108	0.0174**	0.00951	0.00873
	(0.00897)	(0.00758)	(0.00782)	(0.00564)
nMSBS	0.0135	0.0170**	0.0115	0.00951
	(0.00992)	(0.00838)	(0.00865)	(0.00624)
Female	-0.00880	-0.00549	-0.00470	-0.000663
	(0.00632)	(0.00534)	(0.00551)	(0.00398)
Army	0.0398***	0.00527	-0.0142**	0.00559
	(0.00799)	(0.00675)	(0.00697)	(0.00503)
Navy	-0.00205	-0.00386	-0.00487	-0.00963**
	(0.00712)	(0.00601)	(0.00621)	(0.00448)
acc_age	-0.00212***	-0.00116*	-0.000844	-0.00115**
	(0.000772)	(0.000652)	(0.000673)	(0.000486)
E02	-0.0641***	-0.0577***	-0.0419***	-0.0160
	(0.0164)	(0.0138)	(0.0143)	(0.0103)
E03	-0.0150	-0.0444***	-0.0444***	0.00164
	(0.0172)	(0.0145)	(0.0150)	(0.0108)
E04	-0.0453**	-0.0200	-0.0217	-0.0153
	(0.0212)	(0.0179)	(0.0185)	(0.0133)
E05	0.0142	-0.0202	-0.0128	0.00660
	(0.0166)	(0.0140)	(0.0145)	(0.0104)
E07	0.105***	0.00822	0.00143	0.00948
	(0.0198)	(0.0167)	(0.0173)	(0.0125)
EO8	-0.0465	-0.0509	-0.0349	-0.00543
	(0.181)	(0.153)	(0.158)	(0.114)
O00	-0.0568	-0.0562	0.462***	-0.0130
	(0.128)	(0.108)	(0.112)	(0.0808)
O01	-0.0517*	-0.0362	-0.0492*	0.00866
	(0.0310)	(0.0262)	(0.0271)	(0.0195)
O02	-0.0330	0.0964**	0.0200	-0.0115
	(0.0527)	(0.0445)	(0.0459)	(0.0331)
O03	0.00515	-0.0316	0.00320	0.0538***
	(0.0260)	(0.0219)	(0.0226)	(0.0163)
O04	0.0319*	-0.00334	0.0342**	0.0341***
	(0.0178)	(0.0150)	(0.0155)	(0.0112)
Constant	0.0605**	0.0636***	0.0652***	0.0260*
	(0.0248)	(0.0209)	(0.0216)	(0.0156)
Observations	5,215	5,215	5,215	5,215
R-squared	0.044	0.021	0.031	0.019

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11. Regression of All Groups; 12–16 YOS.

VARIABLES	YOS(17)	YOS(18)	YOS(19)	YOS(20)	YOS(21+)
cMSBS	0.00602*	-0.000597	-0.000345	-0.103***	-0.0615***
	(0.00493)	(0.00405)	(0.00336)	(0.00752)	(0.00698)
nMSBS	0.0104*	0.00389	0.00118	-0.109***	-0.0768***
	(0.00545)	(0.00448)	(0.00371)	(0.00832)	(0.00772)
Female	-0.00314	0.00353	-0.00317	-0.00976*	-0.00454
	(0.00347)	(0.00286)	(0.00237)	(0.00530)	(0.00492)
Army	0.00846*	-0.00390	-0.00735**	-0.00116	0.00345
	(0.00439)	(0.00361)	(0.00299)	(0.00670)	(0.00622)
Navy	-0.00332	-0.00436	-0.000939	-0.0143**	-0.0134**
	(0.00391)	(0.00322)	(0.00267)	(0.00597)	(0.00554)
acc_age	-0.000247	6.90e-05	-0.000264	-0.000591	-0.000315
	(0.000424)	(0.000349)	(0.000289)	(0.000647)	(0.000601)
E02	-0.00749	0.00109	-0.0135**	-0.0307**	-0.00854
	(0.00899)	(0.00739)	(0.00613)	(0.0137)	(0.0127)
E03	0.00565	0.000148	-0.0164**	-0.00398	0.0171
	(0.00946)	(0.00778)	(0.00645)	(0.0144)	(0.0134)
E04	0.00463	0.000551	-0.0134*	-0.0237	0.0128
	(0.0116)	(0.00957)	(0.00794)	(0.0178)	(0.0165)
E05	0.00939	0.0125*	-0.0144**	0.0148	0.0430***
	(0.00911)	(0.00749)	(0.00621)	(0.0139)	(0.0129)
E07	0.0330***	0.00837	0.00934	0.121***	0.0895***
	(0.0109)	(0.00896)	(0.00743)	(0.0166)	(0.0154)
EO8	-0.00697	0.000882	-0.0111	-0.0142	-0.000591
	(0.0995)	(0.0818)	(0.0678)	(0.152)	(0.141)
O00	-0.00711	-0.000409	-0.0113	-0.0134	0.500***
	(0.0706)	(0.0580)	(0.0481)	(0.108)	(0.1000)
O01	0.0151	-0.00265	-0.0175	0.0239	0.0295
	(0.0170)	(0.0140)	(0.0116)	(0.0260)	(0.0242)
O02	-0.00312	0.0733***	-0.0210	-0.0160	0.00870
	(0.0289)	(0.0238)	(0.0197)	(0.0442)	(0.0410)
O03	-0.00522	-0.00135	-0.00431	-0.00418	0.0188
	(0.0143)	(0.0117)	(0.00973)	(0.0218)	(0.0202)
O04	0.0212**	0.0119	-0.00992	0.0236	0.0321**
	(0.00978)	(0.00804)	(0.00666)	(0.0149)	(0.0139)
Constant	2.57e-05	0.00152	0.0268***	0.136***	0.0682***
	(0.0136)	(0.0112)	(0.00927)	(0.0208)	(0.0193)
Observations	5,215	5,215	5,215	5,215	5,215
R-squared	0.010	0.009	0.009	0.078	0.050

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12. Regression of All Groups; 17–21+ YOS.

VARIABLES	YOS(5)	YOS(6)	YOS(7)	YOS(8)
nMSBS	-0.0134	0.0107	0.00534	-0.0162*
	(0.00939)	(0.00958)	(0.0101)	(0.00906)
Female	0.0205**	0.0112	0.00453	-9.35e-05
	(0.0101)	(0.0103)	(0.0109)	(0.00971)
Army	-0.00588	-0.0204	-0.0296**	-0.0368***
	(0.0130)	(0.0133)	(0.0141)	(0.0125)
Navy	0.0116	-0.0281**	-0.0139	-0.0300***
	(0.0114)	(0.0116)	(0.0123)	(0.0110)
acc_age	0.000895	0.00347***	-0.00243*	-0.00206*
	(0.00127)	(0.00129)	(0.00137)	(0.00122)
E02	0.0186	0.0502*	0.0646**	0.0486*
	(0.0272)	(0.0277)	(0.0293)	(0.0262)
E03	-0.00640	0.0718**	0.0370	0.0294
	(0.0285)	(0.0291)	(0.0308)	(0.0275)
E04	0.0398	0.0862**	0.143***	0.106***
	(0.0358)	(0.0365)	(0.0387)	(0.0345)
E05	-0.0914***	0.0341	0.0839***	0.104***
	(0.0275)	(0.0281)	(0.0297)	(0.0265)
E07	-0.132***	-0.0442	-0.0440	-0.00357
	(0.0333)	(0.0339)	(0.0359)	(0.0321)
EO8	-0.131	-0.0779	-0.0113	1.008***
	(0.283)	(0.289)	(0.306)	(0.273)
O00	-0.135	-0.0595	-0.0302	-0.00653
	(0.201)	(0.205)	(0.217)	(0.194)
O01	-0.0748	-7.61e-05	-0.0551	0.0350
	(0.0510)	(0.0520)	(0.0550)	(0.0492)
O02	-0.0465	0.0163	-0.0656	-0.0366
	(0.0828)	(0.0844)	(0.0894)	(0.0798)
O03	-0.00223	0.115***	0.00317	0.0907**
	(0.0420)	(0.0428)	(0.0454)	(0.0405)
O04	-0.0964***	-0.0112	0.0314	0.0867***
	(0.0292)	(0.0297)	(0.0315)	(0.0281)
Constant	0.109***	-0.00734	0.115***	0.0919**
	(0.0385)	(0.0393)	(0.0416)	(0.0371)
Observations	4,737	4,737	4,737	4,737
R-squared	0.034	0.016	0.015	0.025

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13. Regression of MSBS Groups; 5–8 YOS.

VARIABLES	YOS(9)	YOS(10)	YOS(11)	YOS(12)
nMSBS	-0.00569	-0.0200**	-0.00635	0.0268***
	(0.00623)	(0.00917)	(0.00680)	(0.00625)
Female	-0.000450	-0.00379	0.00301	-0.00753
	(0.00668)	(0.00983)	(0.00730)	(0.00670)
Army	-0.00601	-0.0183	0.0292***	0.0205**
	(0.00863)	(0.0127)	(0.00943)	(0.00866)
Navy	-0.00549	0.00232	0.0110	-0.0141*
	(0.00757)	(0.0111)	(0.00827)	(0.00759)
acc_age	0.00123	-0.00101	6.37e-05	-7.68e-05
	(0.000841)	(0.00124)	(0.000918)	(0.000843)
E02	0.0249	0.00526	-0.0299	-0.0409**
	(0.0180)	(0.0265)	(0.0197)	(0.0181)
E03	0.0226	-0.00798	0.00610	-0.00962
	(0.0189)	(0.0278)	(0.0206)	(0.0190)
E04	0.0321	0.00878	-0.00705	-0.0283
	(0.0237)	(0.0349)	(0.0259)	(0.0238)
E05	0.0556***	0.129***	0.0590***	0.0341*
	(0.0183)	(0.0269)	(0.0199)	(0.0183)
E07	0.0319	0.125***	0.0764***	0.104***
	(0.0221)	(0.0325)	(0.0241)	(0.0221)
EO8	-0.0119	-0.0229	-0.0390	-0.0420
	(0.188)	(0.276)	(0.205)	(0.188)
O00	-0.00322	-0.0280	-0.0400	-0.0388
	(0.133)	(0.196)	(0.146)	(0.134)
O01	0.00612	-0.0286	-0.0241	-0.0223
	(0.0338)	(0.0497)	(0.0369)	(0.0339)
O02	-0.000644	0.0354	-0.0103	0.0434
	(0.0549)	(0.0808)	(0.0600)	(0.0551)
O03	0.0294	0.0191	-0.0243	-0.0372
	(0.0279)	(0.0410)	(0.0304)	(0.0279)
O04	0.0718***	0.0795***	0.0669***	0.0364*
	(0.0193)	(0.0285)	(0.0211)	(0.0194)
Constant	-0.0195	0.0719*	0.00781	0.0238
	(0.0255)	(0.0376)	(0.0279)	(0.0256)
Observations	4,737	4,737	4,737	4,737
R-squared	0.011	0.049	0.029	0.038

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 14. Regression of MSBS Groups; 9–12 YOS.

VARIABLES	YOS(13)	YOS(14)	YOS(15)	YOS(16)
nMSBS	0.00264	-0.000256	0.00188	0.000730
	(0.00606)	(0.00523)	(0.00539)	(0.00393)
Female	-0.00968	-0.00561	-0.00539	-0.000757
	(0.00650)	(0.00561)	(0.00578)	(0.00422)
Army	0.0399***	0.00511	-0.0131*	0.00795
	(0.00839)	(0.00725)	(0.00747)	(0.00545)
Navy	-0.00219	-0.00441	-0.00221	-0.0107**
	(0.00736)	(0.00636)	(0.00655)	(0.00478)
acc_age	-0.00241***	-0.00128*	-0.00118	-0.00127**
	(0.000818)	(0.000706)	(0.000727)	(0.000531)
E02	-0.0634***	-0.0569***	-0.0479***	-0.0184
	(0.0175)	(0.0151)	(0.0156)	(0.0114)
E03	-0.0142	-0.0427***	-0.0504***	0.00310
	(0.0184)	(0.0159)	(0.0163)	(0.0119)
E04	-0.0409*	-0.0117	-0.0236	-0.0181
	(0.0231)	(0.0199)	(0.0205)	(0.0150)
E05	0.0171	-0.0167	-0.0179	0.00830
	(0.0178)	(0.0153)	(0.0158)	(0.0115)
E07	0.109***	0.0210	0.00461	0.00688
	(0.0215)	(0.0185)	(0.0191)	(0.0139)
EO8	-0.0420	-0.0470	-0.0362	-0.00557
	(0.183)	(0.158)	(0.162)	(0.119)
O00	-0.0538	-0.0530	0.458***	-0.0140
	(0.130)	(0.112)	(0.115)	(0.0842)
O01	-0.0504	-0.0328	-0.0557*	0.0100
	(0.0329)	(0.0284)	(0.0292)	(0.0214)
O02	-0.0314	0.0990**	0.0158	-0.0106
	(0.0534)	(0.0461)	(0.0475)	(0.0347)
O03	0.00877	-0.0284	-0.000135	0.0563***
	(0.0271)	(0.0234)	(0.0241)	(0.0176)
O04	0.0346*	-0.000111	0.0305*	0.0349***
	(0.0188)	(0.0163)	(0.0167)	(0.0122)
Constant	0.0755***	0.0808***	0.0852***	0.0363**
	(0.0248)	(0.0215)	(0.0221)	(0.0161)
Observations	4,737	4,737	4,737	4,737
R-squared	0.044	0.022	0.032	0.019

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 15. Regression of MSBS Groups; 12–16 YOS.

VARIABLES	YOS(17)	YOS(18)	YOS(19)	YOS(20)	YOS(21+)
nMSBS	0.00409	0.00472*	0.00176	-0.00342	-0.0143***
	(0.00339)	(0.00277)	(0.00226)	(0.00409)	(0.00399)
Female	-0.00328	0.00384	-0.00346	-0.00731*	-0.00360
	(0.00364)	(0.00297)	(0.00242)	(0.00439)	(0.00428)
Army	0.0104**	-0.00214	-0.00630**	-0.00747	-0.00332
	(0.00470)	(0.00383)	(0.00313)	(0.00567)	(0.00553)
Navy	-0.00331	-0.00467	-0.00241	-0.0155***	-0.0161***
	(0.00412)	(0.00336)	(0.00275)	(0.00497)	(0.00485)
acc_age	-0.000181	-0.000157	-0.000231	8.22e-06	-0.000462
	(0.000458)	(0.000373)	(0.000305)	(0.000552)	(0.000539)
E02	-0.00864	0.000785	-0.00714	-0.0312***	-0.00765
	(0.00982)	(0.00800)	(0.00654)	(0.0118)	(0.0115)
E03	0.00698	0.00155	-0.00811	-0.0222*	0.00732
	(0.0103)	(0.00839)	(0.00686)	(0.0124)	(0.0121)
E04	-0.00982	0.000218	-0.00698	-0.0317**	-0.00821
	(0.0129)	(0.0105)	(0.00861)	(0.0156)	(0.0152)
E05	0.0111	0.0132	-0.00744	-0.00820	0.0258**
	(0.00995)	(0.00811)	(0.00662)	(0.0120)	(0.0117)
E07	0.0399***	0.0108	0.0221***	0.0556***	0.0722***
	(0.0120)	(0.00980)	(0.00801)	(0.0145)	(0.0141)
EO8	-0.00827	0.00293	-0.00517	-0.0335	-0.00566
	(0.102)	(0.0834)	(0.0681)	(0.123)	(0.120)
O00	-0.00787	-6.85e-05	-0.00504	-0.0298	0.493***
	(0.0726)	(0.0592)	(0.0483)	(0.0876)	(0.0854)
O01	0.0173	-0.00299	-0.0105	-0.00335	0.00419
	(0.0184)	(0.0150)	(0.0123)	(0.0222)	(0.0217)
O02	-0.00176	0.0744***	-0.0137	-0.0358	-0.00436
	(0.0299)	(0.0244)	(0.0199)	(0.0361)	(0.0352)
O03	-0.00489	-0.000970	0.00334	-0.0166	-0.00165
	(0.0152)	(0.0124)	(0.0101)	(0.0183)	(0.0179)
O04	0.0223**	0.0127	-0.00266	-0.00238	0.0228*
	(0.0105)	(0.00859)	(0.00702)	(0.0127)	(0.0124)
Constant	0.00338	0.00399	0.0185**	0.0407**	0.0230
	(0.0139)	(0.0113)	(0.00927)	(0.0168)	(0.0164)
Observations	4,737	4,737	4,737	4,737	4,737
R-squared	0.012	0.009	0.010	0.024	0.033

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 16. Regression of MSBS Groups; 16–21+ YOS.

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